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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

KINGSTON

water pollution control plant

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DIVISION OF PLANT OPERATIONS
Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Kingston Local Advisory Committee,
Township of Kingston.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Kingston Township Water Pollution Control Plant, OWRC Project No. 61-S-98.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

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1965
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ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Kingston Township Water Pollution Control Plant, OWRC Project No. 61-S-98.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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KINGSTON
water pollution control plant

operated for

THE TOWNSHIP OF KINGSTON

by the

ONTARIO WATER RESOURCES COMMISSION

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D. A. Moodie
H. E. Brown
L. E. Venchiarutti

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L. E. Owers
F. A. Voege
K. H. Sharpe
A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'65 REVIEW

In 1965, the second full year of operation, the plant treated a total of 181,105,000 gallons or an average daily flow of 496,000 gallons.

The operating costs of the treatment plant and associated pumping stations in 1965 were $23,348.09 or a cost of $128.92 per million gallons of sewage treated.

The operating costs in 1965 were increased over those of 1964 by $51.32. The salary costs were increased by $799.05 as a result of increased salaries and the utilization of more casual labour in the summer months for ground maintenance and holiday fill-in. Fuel costs were greatly reduced in 1965 because of increased gas production at the plant. The power costs were reduced in 1965 since only 11 monthly power bills were paid. The chlorine costs were increased due to greater flows in 1965.

General supplies decreased slightly in 1965 as did equipment costs. Repairs and maintenance costs increased primarily because of pump repairs.

In December of 1965 it was discovered that a break in the sludge circulating line between the digester and control building had developed. Since the ground was saturated with water, shoring had to be used and the repair costs thus greatly increased. The final repair cost was $2,832.76 and this was charged to the Reserve Fund.

Three sewage pumps, one in each of the package pumping stations, had to be removed for repairs and a new sleeve fitted on the shafts. The sludge pump in the control building also had to be rebuilt.

Four flights and all of the shoes on the primary tank collector chains were replaced in 1965.

The raw sewage pumping room was painted in 1965 as were all the pumps at the plant and in the package pumping station.

High flows were received at the plant during storm flows. Some flooding of basements also occurred during these high flows since the pumping capacity at the pumping stations was exceeded.

The plant produced a very satisfactory effluent in 1965. The average strength of the effluent was 6 ppm BOD and 6 ppm SS. This is well within OWRC objectives.

The plant was inspected routinely by Head Office Engineers and Technicians and found to be in a clean and satisfactory condition.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1961 – 1965

INCEPTION

In March of 1961, the municipality of the Township of Kingston contacted the Ontario Water Resources Commission requesting it to take over the Township of Kingston sewage problem. The firm of R. V. Anderson was engaged to prepare plans and specifications for the treatment plant and the firm of Campbell Smith was engaged to prepare plans and specifications for the sanitary sewers and pertinent pumping stations.

APPROVAL

On March 15, 1962, the Township of Kingston signed an agreement with the Ontario Water Resources Commission to finance, construct, and operate the system.

CONSTRUCTION

The construction of the project was started in 1962 and in August of 1963, the Division of Plant Operations took over the operation.

TOTAL COST

$947,955.97



J. CLELAND
CHIEF OPERATOR

Project Staff

Operator - B. McIvor

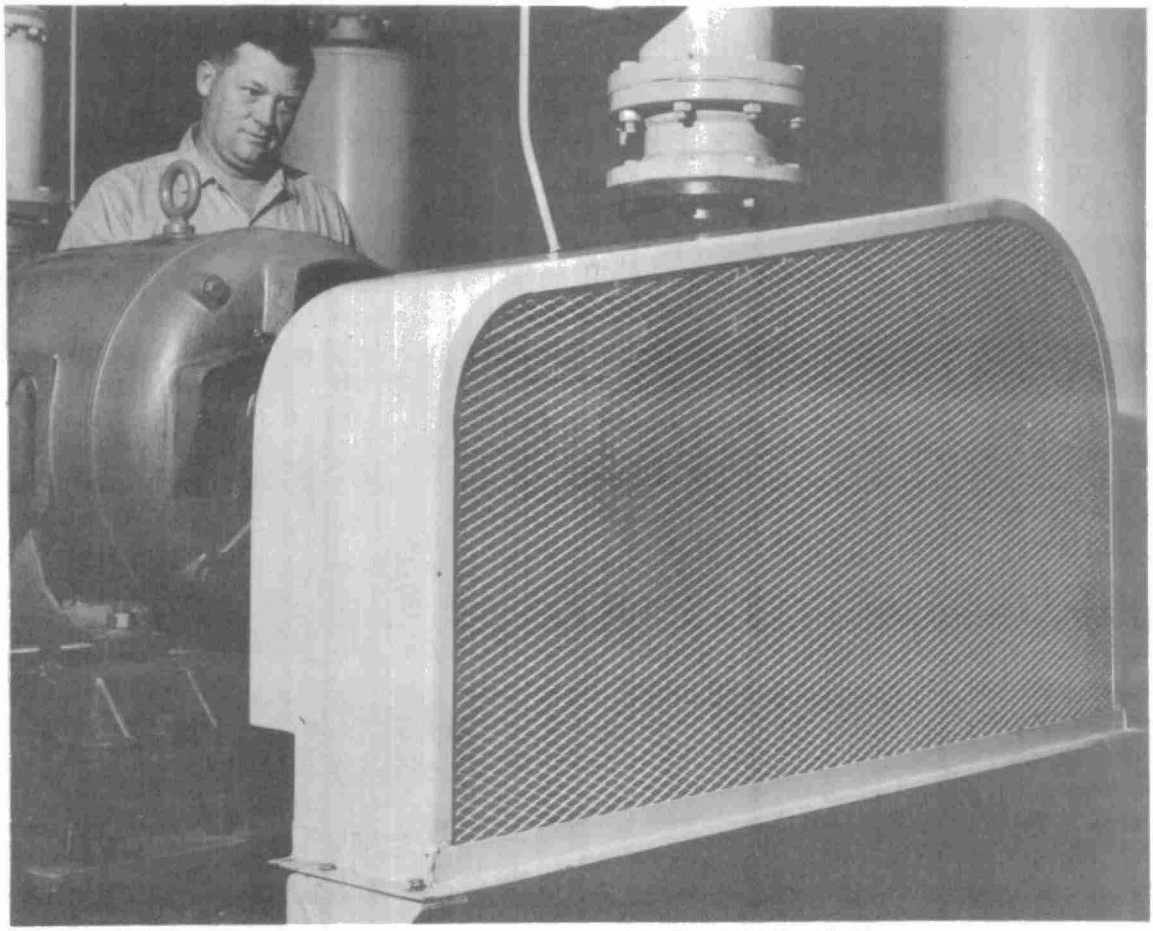
COMMENTS

The staff complement at the Township of Kingston Water Pollution Control Plant consists of two men. Casual labour is employed during the summer months.

Mr. J. Cleland is the Chief Operator at the plant and commenced work with the Commission in 1963 when the plant was opened. Mr. Cleland attended the junior and intermediate sewage operators' course in Toronto in 1965. A gas fitters course was held in Belleville in the fall of 1965 to certify operators to work on gas equipment. The Department of Energy and Resources has made certification mandatory in 1966. Mr. Cleland also completed the gas fitters course satisfactorily.

Mr. B. McIvor commenced work with the Commission as a casual operator and in May of 1965 was placed on temporary staff as an operator .

The staff has operated the plant in a satisfactory manner.



J. CLELAND WITH ONE OF TWO AIR BLOWERS THAT SUPPLY AIR TO AERATION TANKS

Description of Project

COLLECTION SYSTEM

Waste from the Township of Kingston is directed to three lift stations which pump it to a 36-inch trunk sewer on Airport Road through which it flows by gravity to the treatment plant.

Pumping station No. 1 on Day's Road handles the sewage from the LaSalle Park and Henderson Place subdivisions, the industrial site, and the penitentiary. Stations No. 2 (Airport Road) and No. 3 (Crerar Boulevard) pump the sewage from the Reddendale and Point Crescent subdivisions. The 12-inch forcemain from station No. 1 and the 8-inch forcemain from station No. 2 join the 36-inch trunk sewer at the intersection of Day's Road and Airport Road. A 6-inch forcemain from the No. 3 station enters the trunk at Airport Road and Crerar Boulevard.

All pumps in each pumping station are "Flomatcher controlled". The operation of the flomatcher is explained below in the description of the treatment plant.

Sewage flows eastward along Airport Road to Beeman Avenue where it turns south and enters the Water Pollu- Control Plant.

INFLUENT WORKS

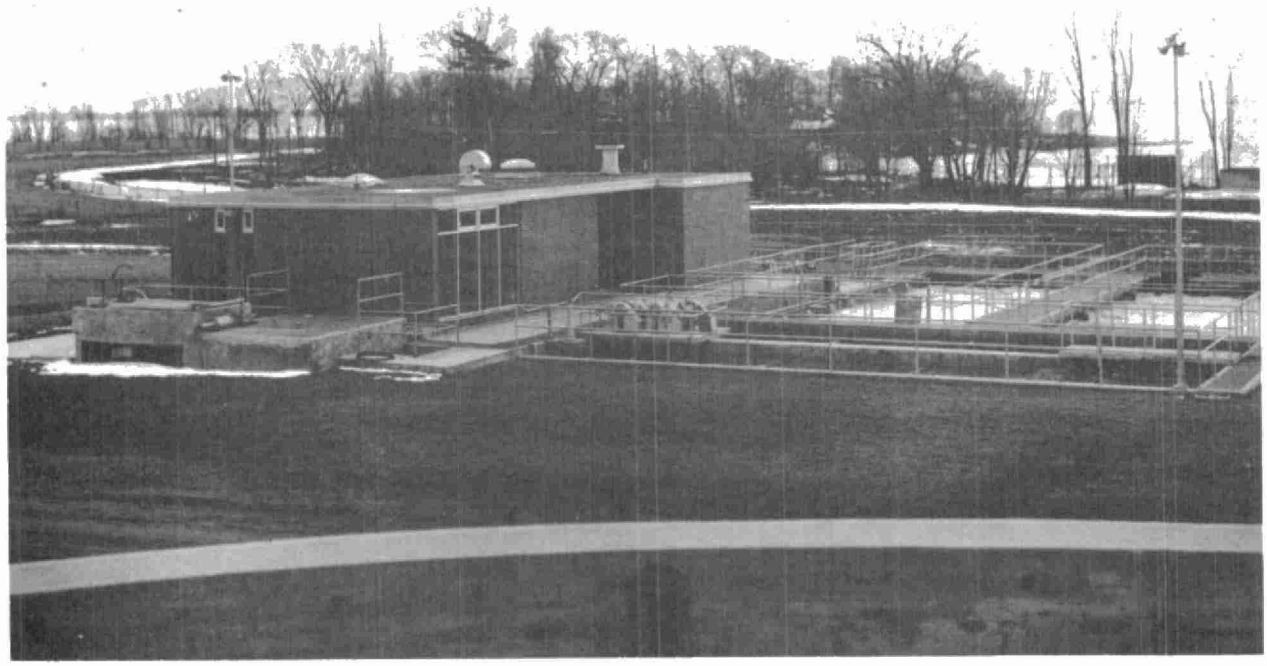
On the plant grounds, the 36-inch trunk sewer meets a bypass manhole where, in case of extreme emergency, the entire plant may be bypassed. From this manhole, a 21-inch corrugated metal pipe leads to the barminutor where large objects are cut and shredded to a size suitable for further treatment. Then the waste enters the wet well where two non-clog sewage pumps lift it to the grit chamber.

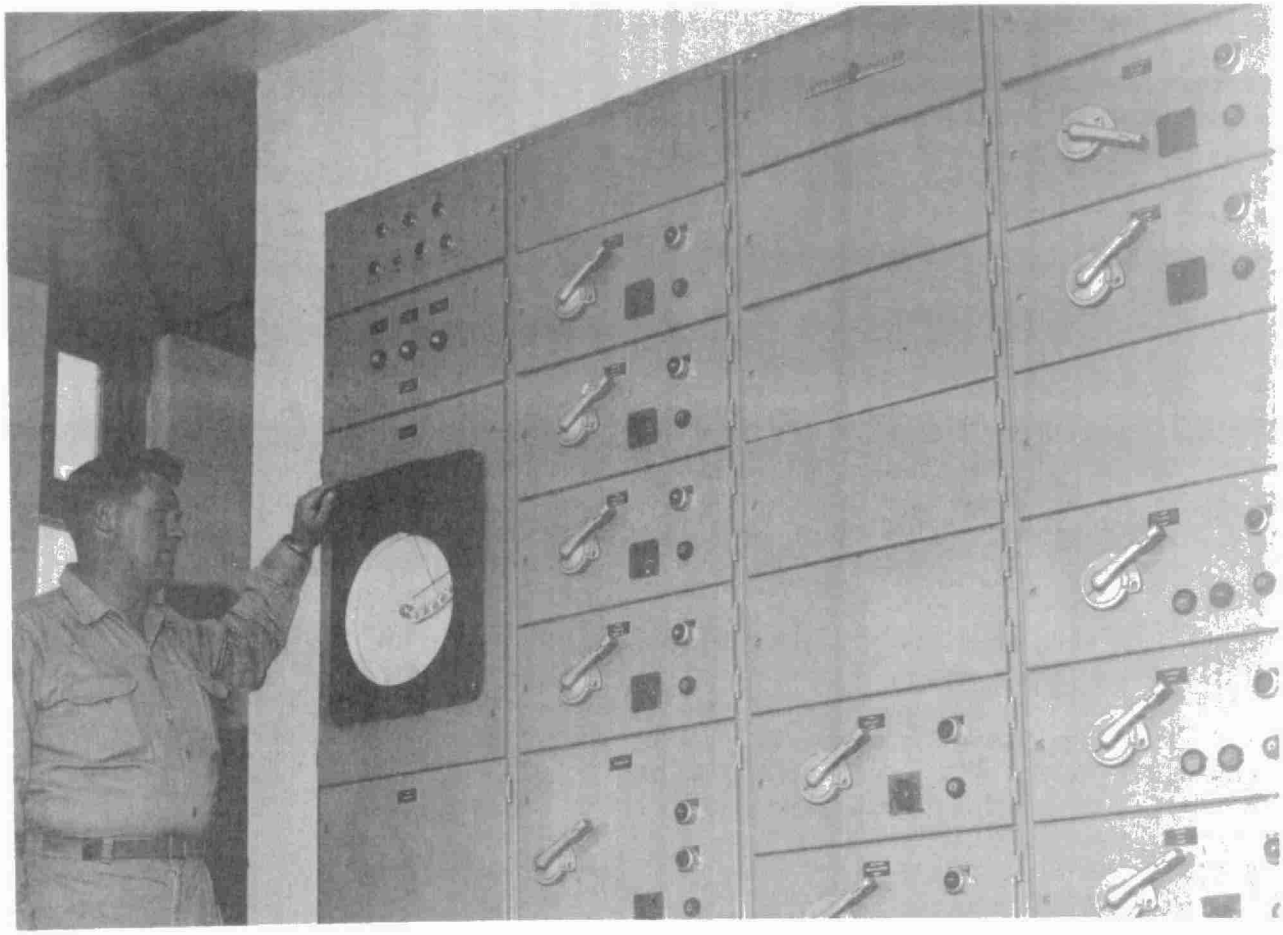
These pumps are also Flomatcher controlled. Wound rotor induction motors drive these pumps and their speed is determined by the liquid level in the wet well. The Flomatcher equipment acts like a large rheostat, driving the motors at a slow speed when the wet well level is low and at an increased speed as the wet well fills. By using a Flomatcher, no sudden surges are sent through the plant to upset the treatment process.

Detention time in the grit chamber is such that only the heavy materials, such as sand, gravel, and other inorganic detritus, have time to settle. From the bottom of this chamber, the grit is air-lifted to decanting channels where it is washed of organic materials and can be easily removed for disposal. The washings are returned to the normal sewage flow for further treatment.

PRIMARY CLARIFIERS

From the grit chamber, the sewage flows to two rectangular primary clarifiers operating in parallel. In these clarifiers, raw sludge settled to the bottom and greasy materials float to the top to form a scum. Each tank is equipped with a longitudinal collector on a continuous chain which moves the settled raw sludge along the bottom to a sump, and decants the scum into a trough on its return travel. A helicoid mechanism in the sump draws the raw sludge to a withdrawal pipe. The raw sludge may be withdrawn directly and pumped to the digester, or it may be re-





MR. CLELAND INSPECTS MAIN CONTROL PANEL

tained in a raw sludge hopper and then pumped to the digester. Any scum removed by the longitudinal collectors flows by gravity to the raw sludge hopper.

Thus far, the treatment processes of grit removal and primary sedimentation will remove approximately 35% of the objectionable matter in the sewage. The primary effluent consists mostly of dissolved and fine suspended materials on which further sedimentation would have little or no effect. A different form of treatment must now be utilized if any substantial increase in the efficiency of removal is to be obtained.

SECONDARY TREATMENT

Secondary treatment employs a gelatinous biological floc which traps and absorbs the remaining objectionable materials of the primary effluent. In order to survive and reproduce, the colonies of micro-organisms need oxygen and this is supplied in aeration tanks where large quantities of air are bubbled through the liquid. Oxygen is transferred from the air bubbles to the liquid and, in turn, to the micro-organisms in each floc to provide a healthy growth stimulating environment. As with all living beings, the micro-organisms grow and multiply with the intake of food. This food is the contaminating materials in the sewage. Removal of dissolved and finely suspended matter is thus effected.

Once removal is completed in the aeration tanks, these microbial flocs are settled in the two final clarifiers and returned to the primary effluent to treat more incoming sewage. By return pum-

ping of this "activated sludge", a continuous process is established whereby all primary effluent receives secondary treatment.

At times, the mass of micro-organisms to be returned to the aeration section may become excessive and can throw the process out of balance. When this occurs, a portion of the activated sludge must be wasted. This is done by returning some of it directly to the primary clarifiers where it settled with the raw sludge and is pumped to the digester.

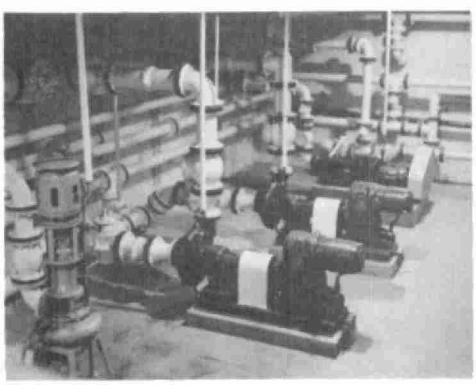
The effluent from the final clarifiers should have about 90 to 95% of the objectionable matter removed. It is then disinfected by the addition of chlorine and is discharged into Lake Ontario through approximately 3000 feet of outfall sewer.

DIGESTION

Sludge digestion at the Township of Kingston Water Pollution Control Plant is accomplished in a single stage digester. As raw sludge accumulates in the primary clarifiers, it is siphoned into the raw sludge hopper where its volume is measured and its consistency observed. Then, at frequent intervals, it may be pumped either directly to the digester, or through a heat exchanger, which raises its temperature, and then to the digester. Sludge already in the digester may be heated by circulating it through the heat exchanger and returning it to the digester.



AERATION TANKS



SLUDGE PUMPS AND PIPE GALLERY



THE TWO RAW SEWAGE LIFT PUMPS

Anaerobic sludge digestion occurs at an increased temperature and in the absence of oxygen. Micro-organisms reduce the putrescible raw sludge to a stable and relatively inoffensive digested sludge. In this process, the volume of sludge is reduced and various gases are produced. One of these gases is methane, a hydrocarbon, and it is used to fire the heat exchanger. Oil is used as a standby fuel.

Once the digester is full, room for additional raw sludge is made by pumping the digested sludge to the sludge drying beds where it is de-watered and forms a cake-like material which is suitable for easy disposal.

PROJECT COSTS

NET CAPITAL COST (Estimated)		$1,536,459.53
DEDUCT - Portion Financed by CMHC (Estimated)	$431,721.56	
- Payments from Municipalities	156,782.00	588,503.56
Long Term Debt to OWRC		$ 947,955.97
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		-
Net Operating		$ 23,348.09
Debt Retirement		-
Reserve		10,602.35
Interest Charged		51,466.31
TOTAL		$ 85,416.75

RESERVE ACCOUNT

Balance at January 1, 1965	$ 11,051.65
Deposited by Municipality	10,602.35
Interest Earned	838.34
	$ 22,492.34
Less Expenditures	-
Balance at December 31, 1965	$ 22,492.34

MONTHLY OPERATING COSTS

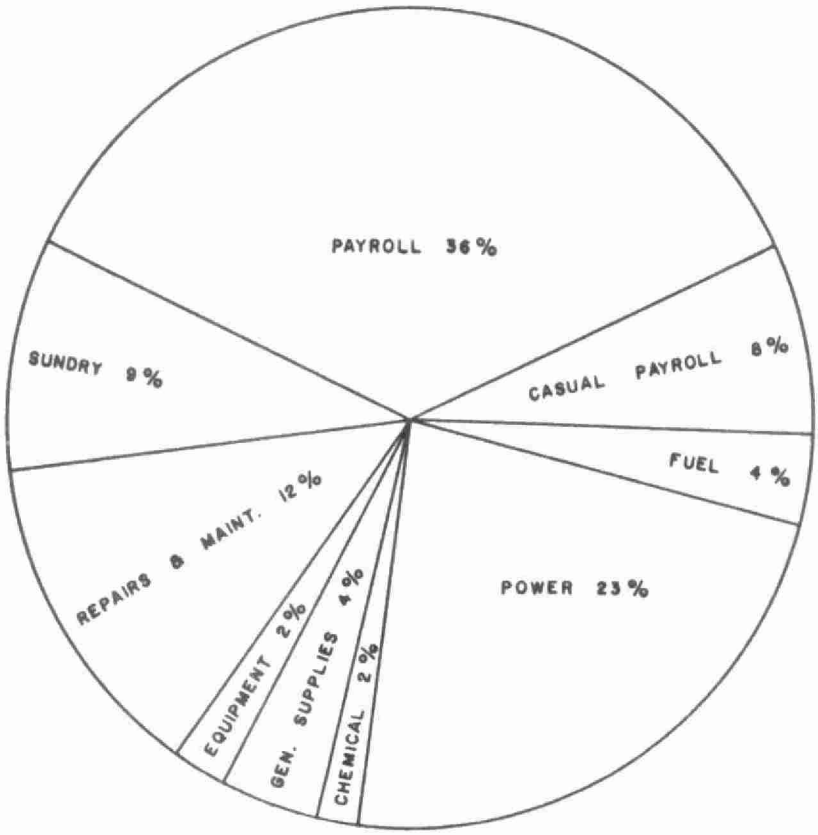
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	925.55	502.73	378.70	18.55		(62.01)	6.89		41.91	38.78	
FEB	1690.52	385.45	314.18	197.66	477.16		113.54		29.34	173.19	
MARCH	2642.13	509.10	234.70	101.70	539.47		200.00	94.80	198.39	763.97	
APRIL	1861.77	473.12	415.48	204.75	509.14		24.64	6.65	46.31	181.68	
MAY	2166.96	1046.57			508.21	224.03	113.80	13.02	170.95	90.38	
JUNE	2285.26	702.46	72.00	112.05	495.39		62.77	167.82	518.74	154.03	
JULY	2179.55	707.07	288.00		448.44	58.58	75.58	140.32	432.03	29.53	
AUG	1452.35	709.50	91.92			224.03	117.15	47.57	124.01	138.17	
SEPT	1520.20	709.50			526.09		70.36	28.17	47.95	138.13	
OCT	2304.44	1100.22			941.73		(2.53)		191.79	73.23	
NOV	1470.70	754.38			495.48		91.61		4.50	124.73	
DEC	2848.66	760.95	30.00	234.61	461.16		46.99		1093.34	221.61	
TOTAL	23348.09	8361.05	1824.98	869.32	5402.27	444.63	920.80	498.35	2899.26	2127.43	

BRACKETS INDICATE CREDIT

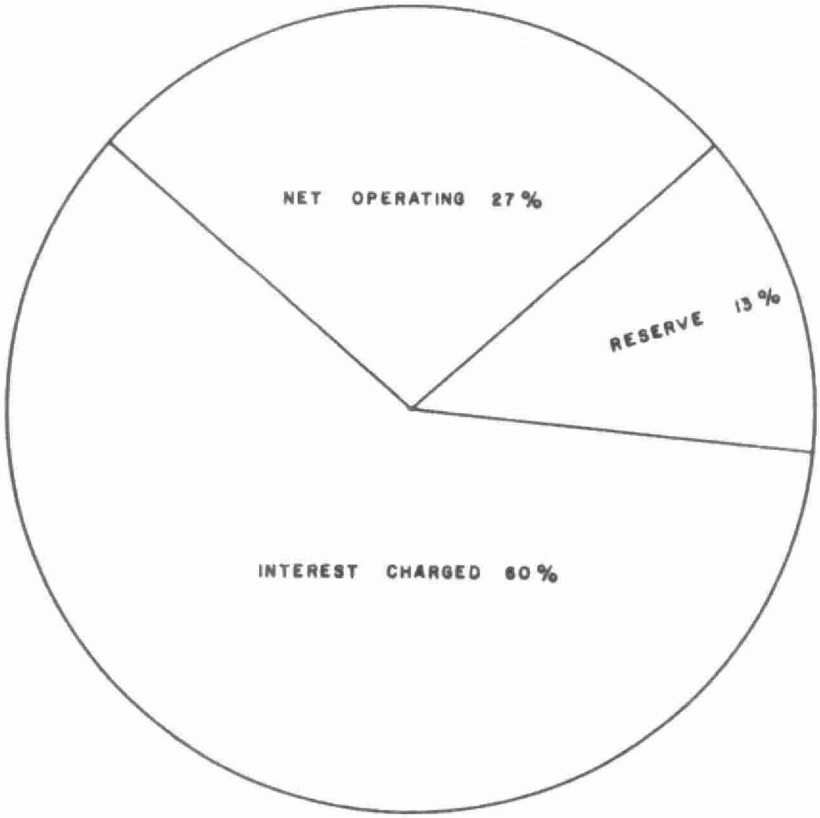
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1964	111.630	$23,296.77	$214.34	43½ CENTS
1965	181.105	23,348.09	128.92	10 CENTS

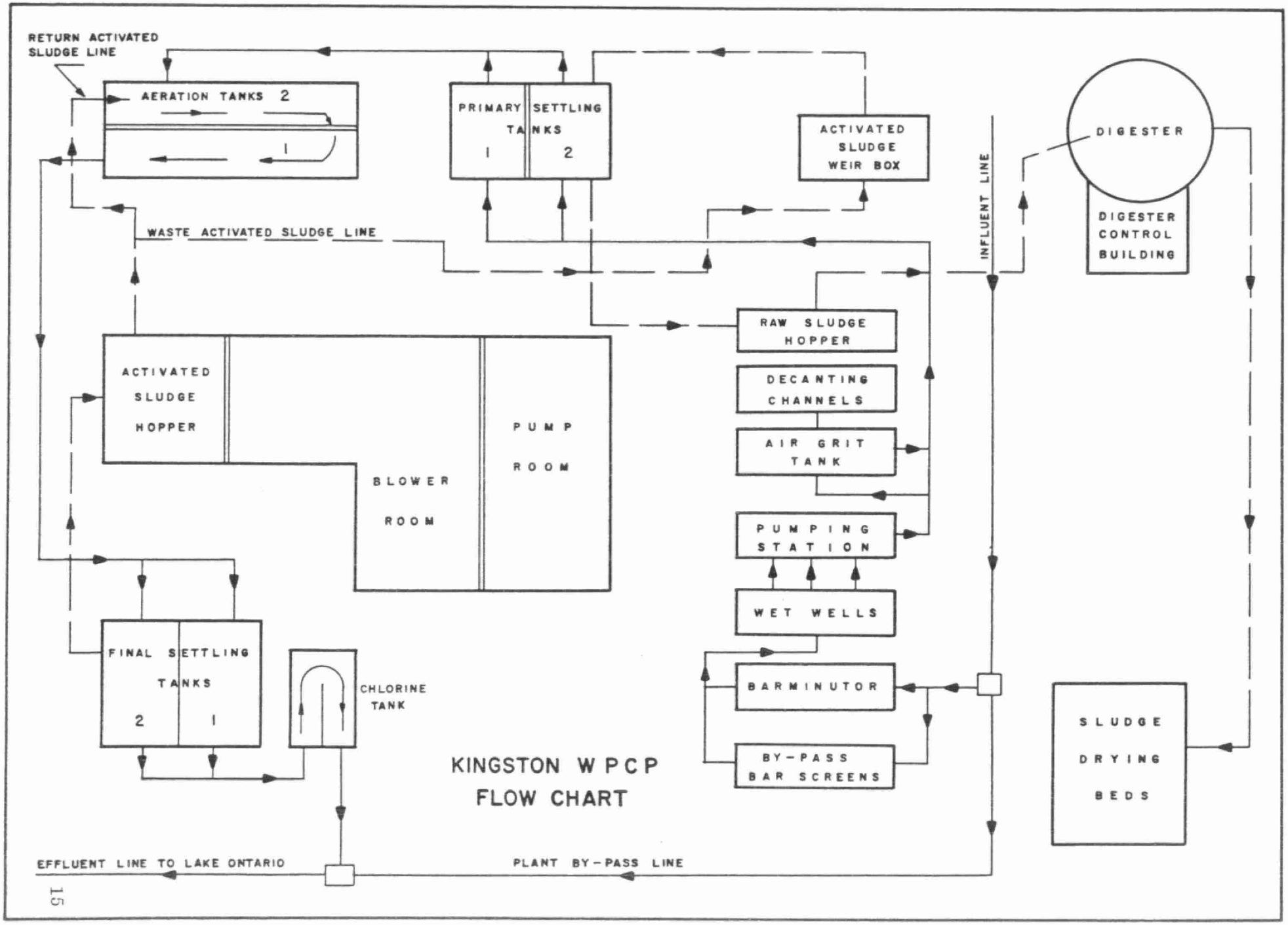
1965 OPERATING COSTS



TOTAL ANNUAL COST



Technical Section


RETURN ACTIVATED SLUDGE LINE
AERATION TANKS 2
1
PRIMARY SETTLING TANKS
1
2
ACTIVATED SLUDGE WEIR BOX
INFLUENT LINE
DIGESTER
DIGESTER CONTROL BUILDING
WASTE ACTIVATED SLUDGE LINE
RAW SLUDGE HOPPER
DECANTING CHANNELS
AIR GRIT TANK
ACTIVATED SLUDGE HOPPER
BLOWER ROOM
PUMP ROOM
PUMPING STATION
WET WELLS
FINAL SETTLING TANKS
2
1
CHLORINE TANK
BARMINUTOR
BY-PASS BAR SCREENS
SLUDGE DRYING BEDS
KINGSTON W P C P
FLOW CHART
EFFLUENT LINE TO LAKE ONTARIO
PLANT BY-PASS LINE

Design-Data

GENERAL

Type of Plant - Activated sludge treatment.

Design Population - 10,000 persons.

Average Design Plant Flow - 830 gallons per day.

5 Day BOD - 210 ppm.

Suspended Solids - 250 ppm.

PRIMARY TREATMENT

Influent Sewer

36 inch concrete gravity sewer to a bypass manhole. 21 inch corrugated metal pipe sewer from the bypass manhole to the wet well.

Screening

One Chicago Pump Company 18 inch Model "C" Barminutor. Capacity 2.8 mgd. Manually cleaned bar screen with 1 inch spacings in the bypass channel.

Sewage Lift Pumps

Two Weinman type "VBM" non-clog vertical frame pumps. 1200 gpm. at 35 ft. T.D.H. Powered by Brook wound rotor motors. 15 hp., 1090 rpm., 3 phase, 60 cycle, 550 volts. Flomatcher controlled.

Grit Removal

1920 gallon air grit tank. Detention time at design flow - 2 minutes. Grit removed by air lift to grit decanting channels.

Primary Settling Tanks

Two rectangular units each 12 ft. x 46 ft. x 7 ft. - 7 in.

Volume - 8380 cu. ft. or 52,200 gallons.

Detention Time - 1.5 hours at average design flow.

Surface Settling Rate - 750 gallons per square foot of tank per day.

Weir Overflow Rate - 8600 gallons per foot of weir length per day.

Each primary tank has one rectangular sludge collector with scum provisions and one helicoid cross-collector.

SECONDARY TREATMENT

Aeration Section

Two rectangular aeration tanks 22.5 ft. x 62.0 ft. x 15.0 ft.

Volume - 41,900 cu. ft. or 262,000 gallons.

Detention Time - 7.5 hours at average design flow.

Loading - 1170 pounds of 5 day BOD per day.

Air Supply - Two Roots-Connersville size 10 x 11 - Type RCR blowers of 880 cfm each 7-1/2 psig.

Diffusers - Chicago Pump Company "Discfusers".

Secondary Settling Tanks

Two rectangular units each 12 ft. x 56 ft. x 9 ft.

Volume - 12,100 cu. ft. or 75,600 Imperial gallons.

Detention Time - 2.2 hours at average design flow.

Surface Settling Rate - 562 Imperial gallons per square foot of tank per day.

Weir Overflow Rate - 5050 Imperial gallons per foot of weir length per day.

Each secondary tank has one rectangular sludge collector and one helicoid cross-collector.

Chlorination

Volume of contact channels 1650 cu. ft. or 10,300 Imperial gallons.

Detention Time - 18 minutes at average design flow.

Chlorinator - Wallace and Tiernan series A-731 - V-notch variable orifice unit having a maximum capacity of 400 pounds of chlorine per day with present metering for 100 pounds of chlorine per day.

SLUDGE HAULING FACILITIES

Digester

Single stage sludge digestion in one 55 ft. diameter x 20 ft. SWD floating cover tank.

Volume - 54,500 cu. ft. or 340,000 gallons.

Recirculation by means of a pump on time-clock control.

Heat Exchanger

One Scotch Marine Boiler - 555,000 B. T. U. per hour with a "Cyclone" burner operating on either fuel oil or digester gas.

Sludge Drying Beds

Four beds each 20 ft. x 80 ft.

PUMPING STATION NUMBER ONE (DAYS ROAD)

Pumps

Two Fairbanks-Morse Pumps - 1000 gpm. at 53 ft. T. D. H. 8 inch suction and 6 inch discharge.

Motors

Two English Electric Wound Rotor motors - 25 hp., 1750 rpm, 3 phase, 60 cycle, 550 volts, 23.6 amps.

Flomatcher controlled.

PUMPING STATION NUMBER TWO (AIRPORT ROAD)

Pumps

Two Fairbanks-Morse pumps - 400 gpm. at 44 ft. T. D. H. - 5 inch suction and 5 inch discharge.

Motors

Two English Electric Wound Rotor motors - 10 hp., 1150 rpm, 3 phase, 60 cycle, 550 volts, 10.9 amps.

Flomatcher controlled.

PUMPING STATION NUMBER THREE (CRERAR BLVD.)

Pumps

Two Fairbanks Morse Pumps 400 gpm. at 62 ft. T. D. H. - 4 inch suction and 4 inch discharge.

Motors

Two English Electric Wound Rotor motors - 15 hp., 1750 rpm, 3 phase, 60 cycle, 550 volts, 15.1 amps.

Flomatcher controlled.

Process Data

PROBABILITY FLOWS

Sewage flows to the Township of Kingston Water Pollution Control Plant in 1965 averaged 496,000 gallons per day. This is an increase of 60 percent over the 1964 average daily flow of 310,000 gallons per day.

An examination of the graph of probability of flows reflects the increased flows in that the 1965 curve has shifted above the 1964 curve.

In 1965, 10 percent of the time the flows to the plant exceeded 730,000 gallons per day.

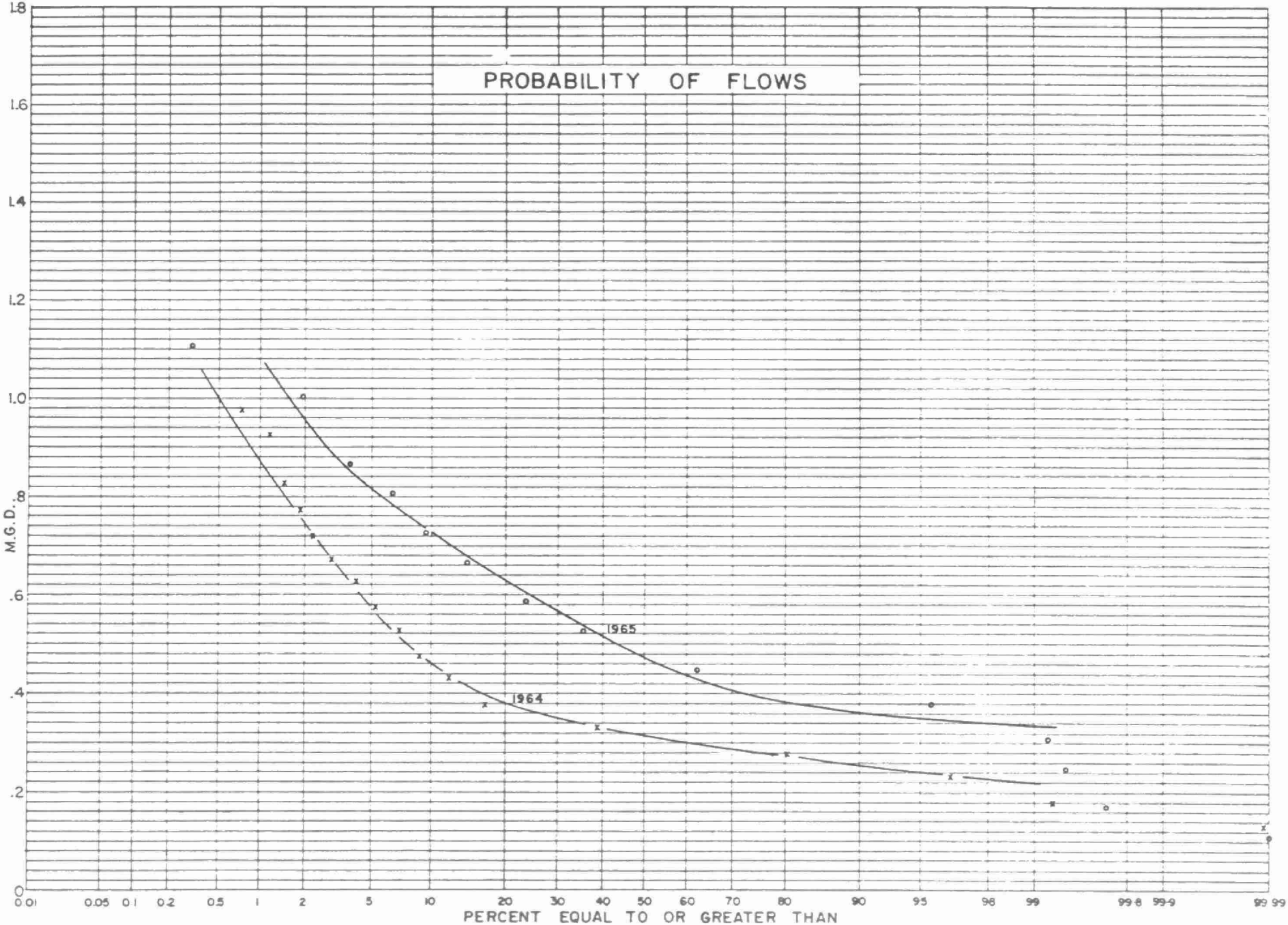
DAILY FLOW GRAPH

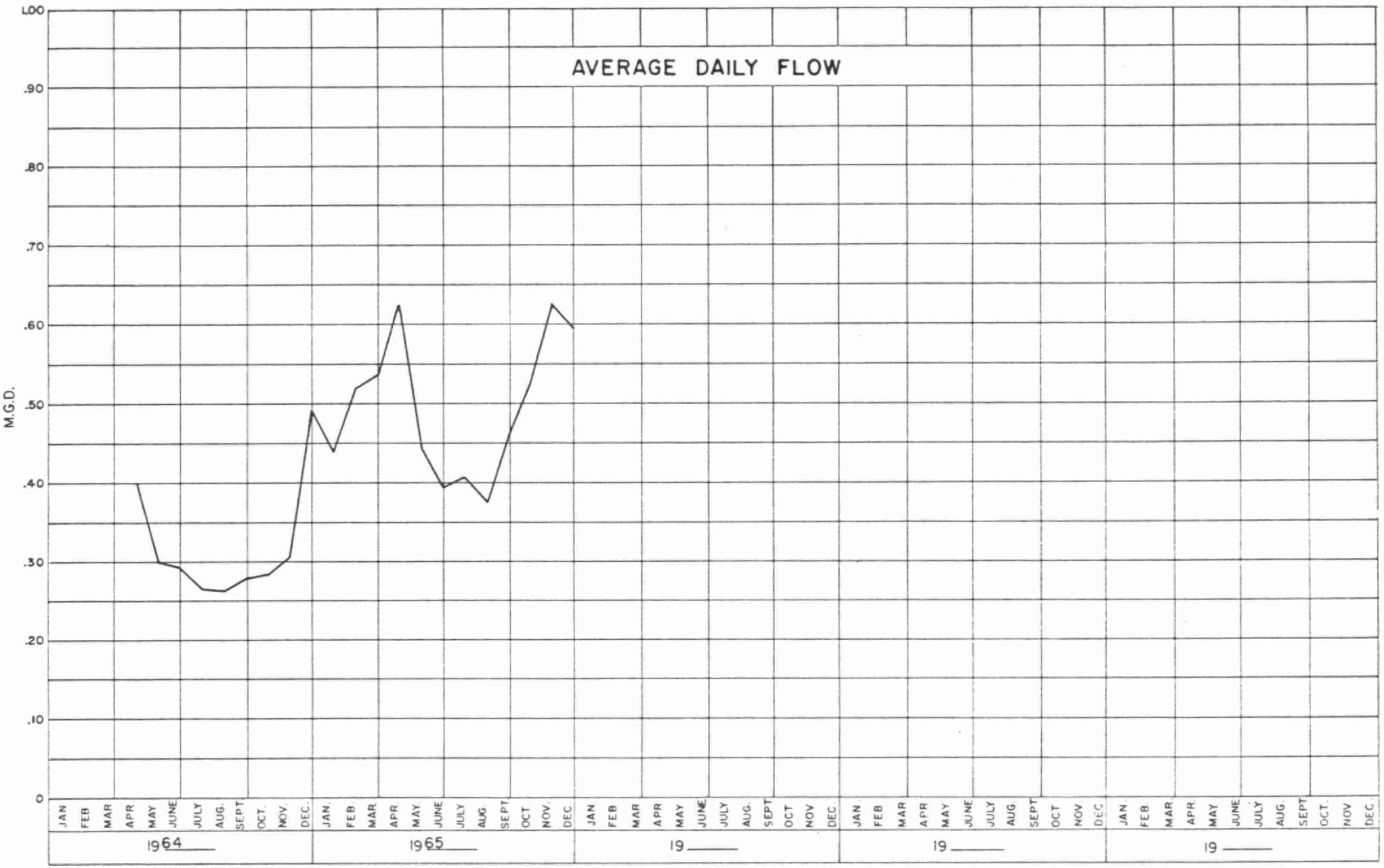
It will be noted from the plot of daily flows that the dry weather flows were approximately 400,000 gallons per day. The peaks that appear on the graph were due to storm of surface water entering the sewer collection system. Peaks were very evident in February, March, and April. In October, November, and December, the peaks were more frequent because of the wet weather experienced at that time.

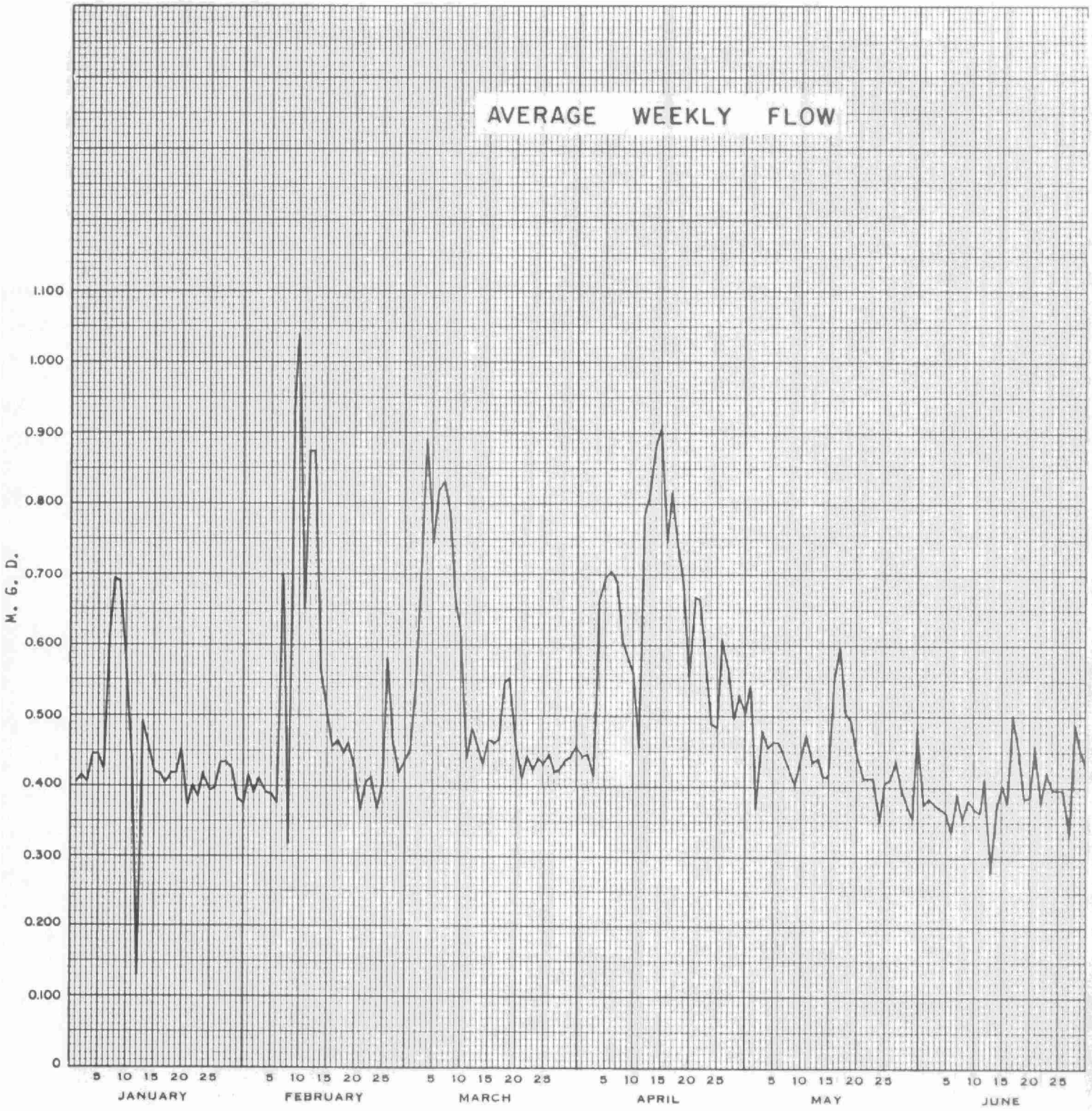
OPERATING RESULTS

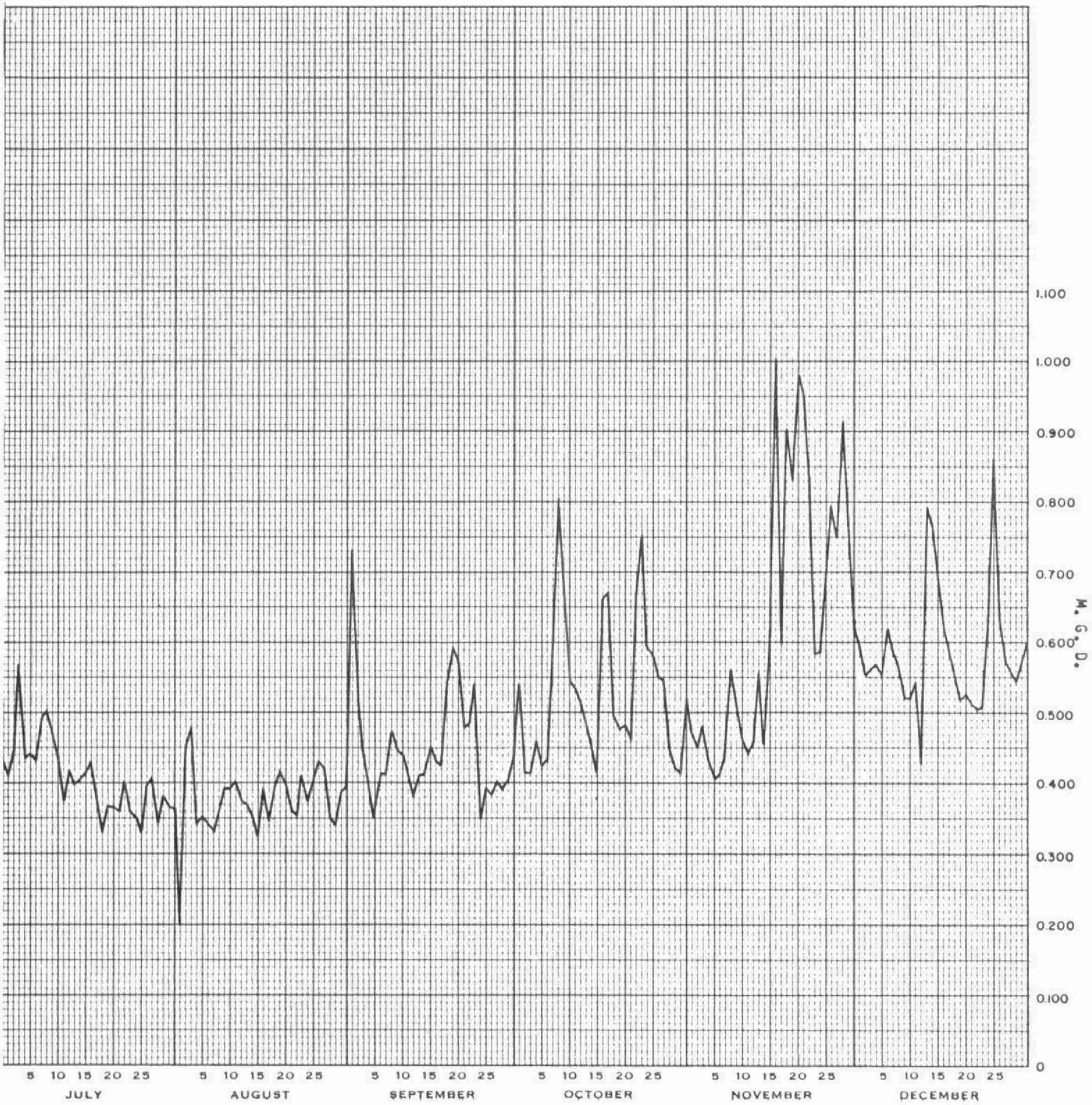
It should be noted from the graph of probability of BOD that in 1965, 50 percent of the time the BOD in the raw sewage exceeded 120 ppm, whereas in 1964 the raw sewage BOD exceeded approximately 60 ppm, 50 percent of the time.

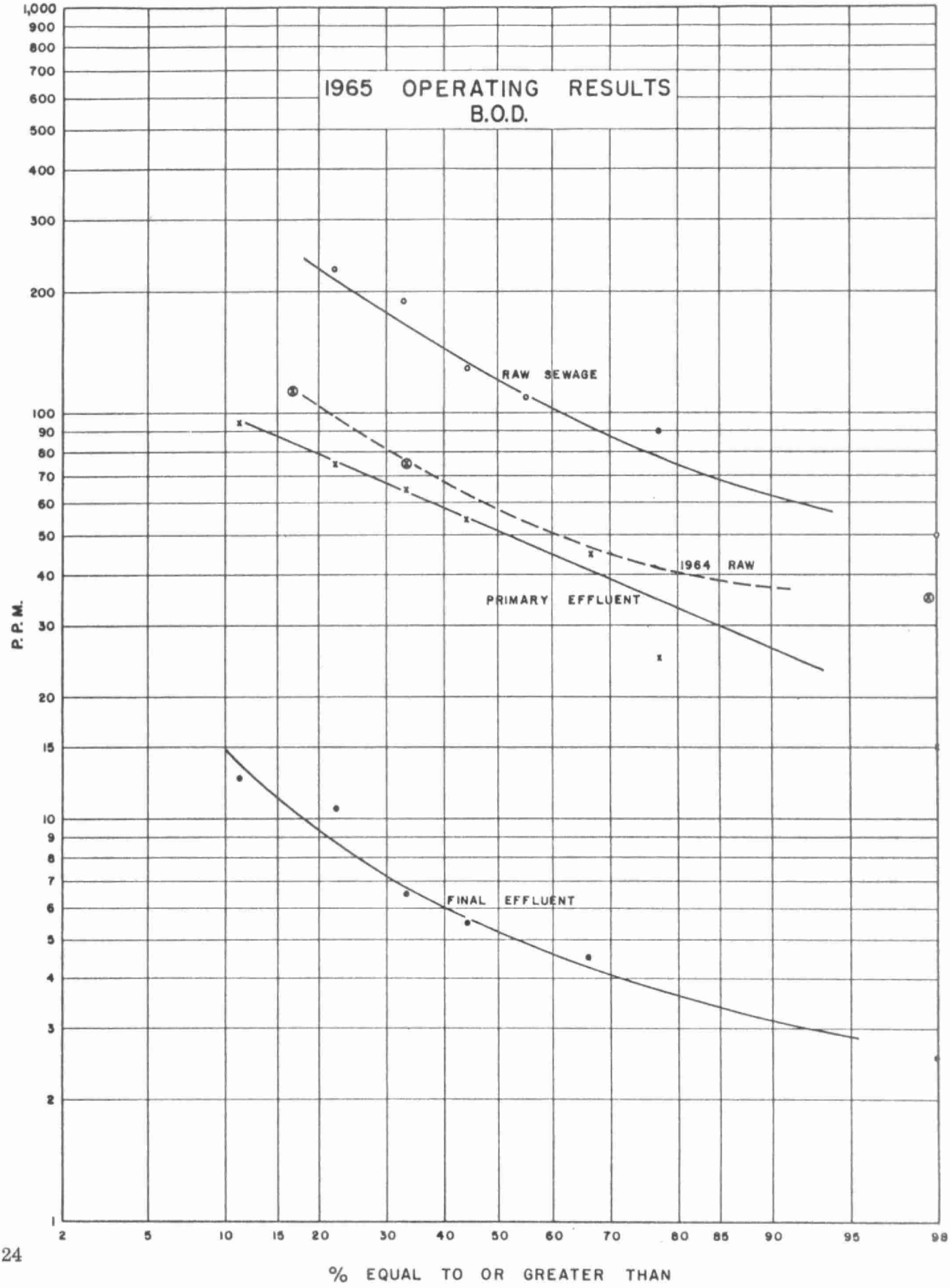
The graph of probability of suspended solids shows that in 1965 the concentration of suspended solids in the raw sewage exceeded 130 ppm 50 percent of the time, whereas in 1964 the concentration exceeded 70 ppm 50 percent of the time.

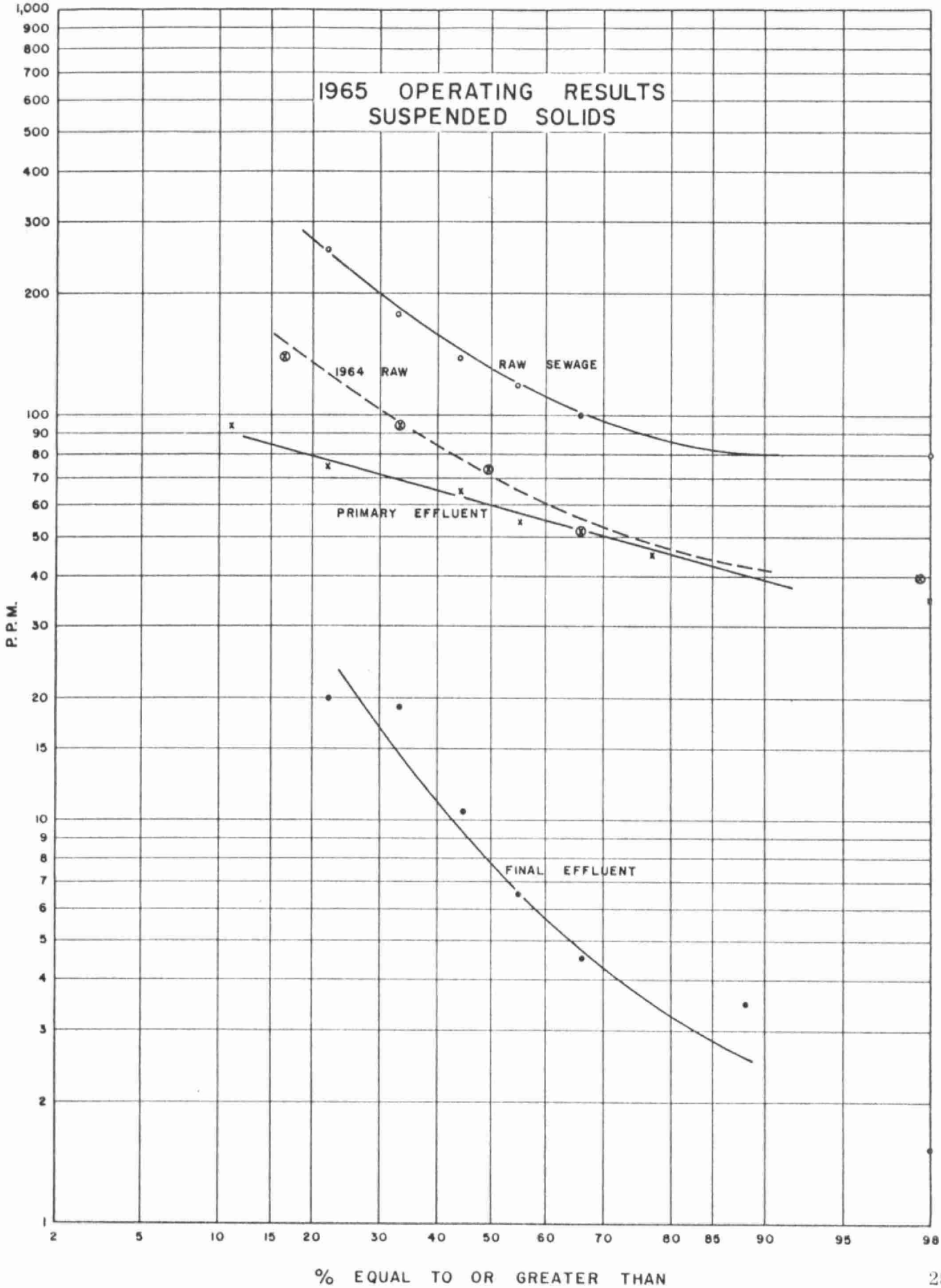

PROBABILITY OF FLOWS
M.G.D.
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
1965
1964
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT EQUAL TO OR GREATER THAN

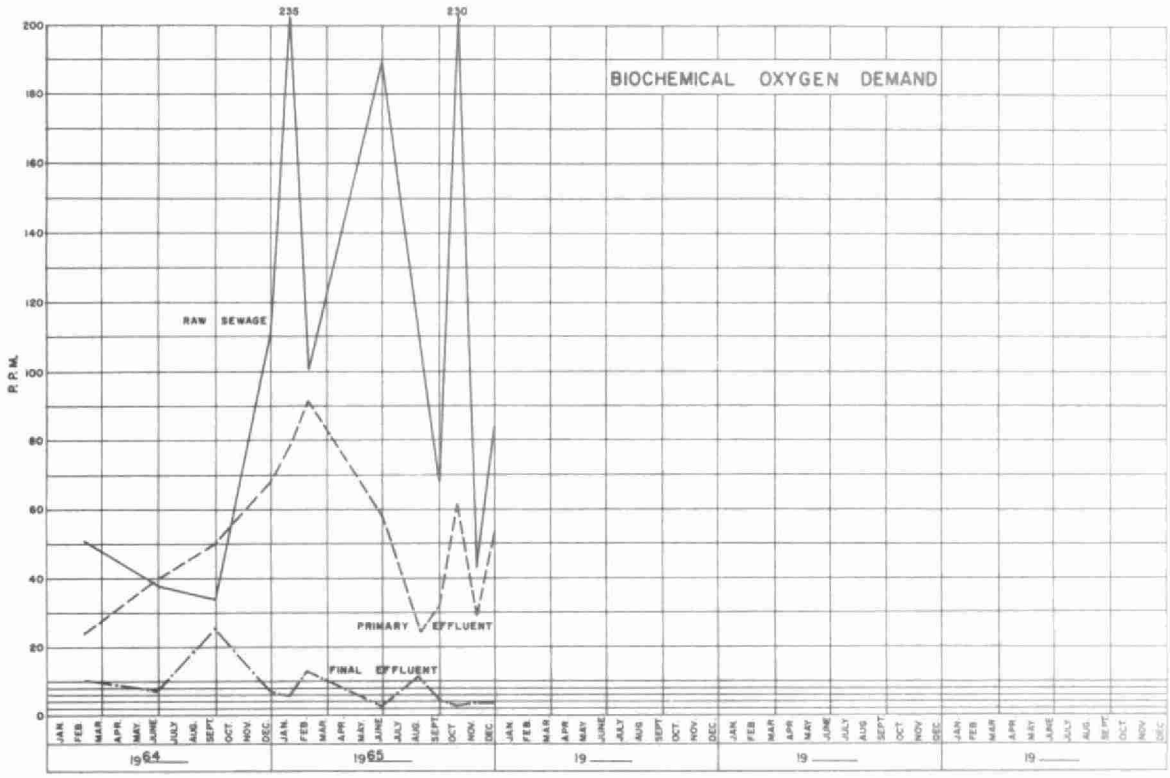

AVERAGE DAILY FLOW
M.G.D.
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1964
1965
19


AVERAGE WEEKLY FLOW
M. G. D.
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0
5 10 15 20 25
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE

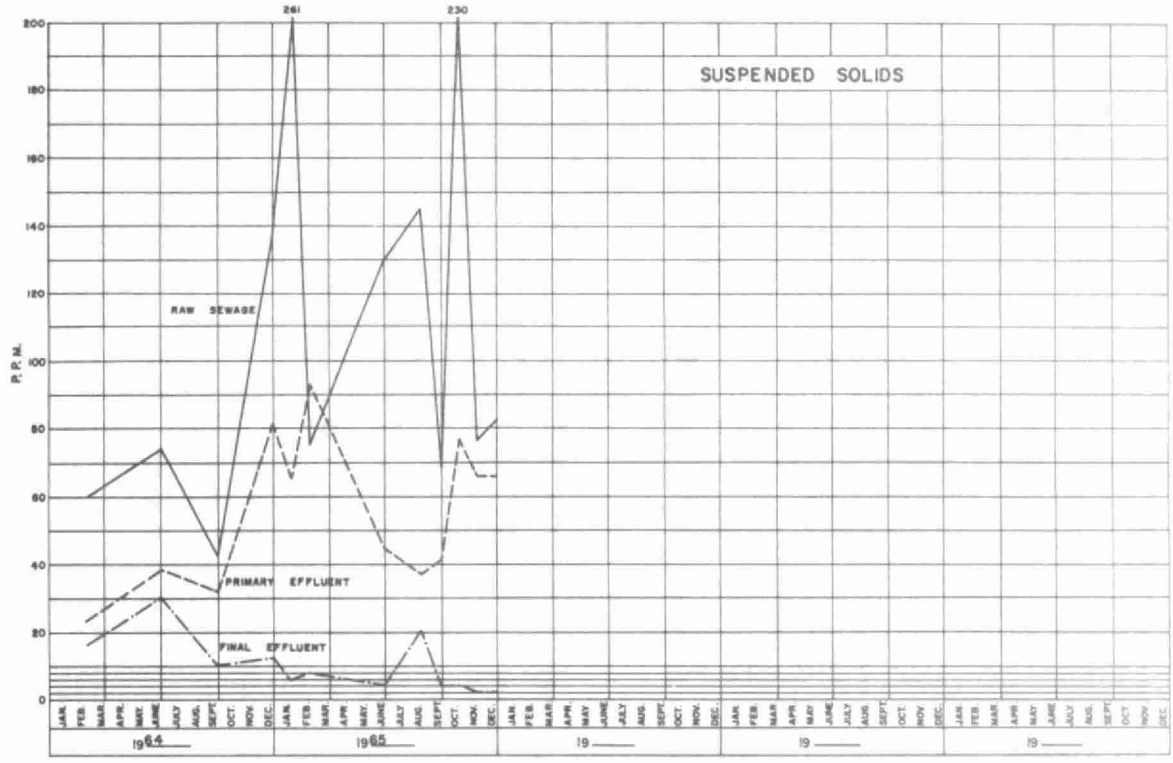

1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0
M. G. D.
5 10 15 20 25
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER


1965 OPERATING RESULTS
B.O.D.
RAW SEWAGE
1964 RAW
PRIMARY EFFLUENT
FINAL EFFLUENT
P.P.M.
% EQUAL TO OR GREATER THAN
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98


1965 OPERATING RESULTS
SUSPENDED SOLIDS
RAW SEWAGE
1964 RAW
PRIMARY EFFLUENT
FINAL EFFLUENT
P. P. M.
% EQUAL TO OR GREATER THAN
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	235	6	97.5	15.6	261	5	98.0	17.5	25
FEB.	102	13	87.0	6.5	75	7	91.0	5.0	13
MAR.	134	6	95.5	10.7	149	6	96.0	11.9	-
APR.	134	6	95.5	12.0	149	6	96.0	13.4	15
MAY	134	6	95.5	8.8	149	6	96.0	9.8	-
JUNE	190	2.4	98.5	11.1	130	4	97.0	7.5	13
JULY	134	6	95.5	8.1	149	6	96.0	9.0	7
AUG.	120	11	91.0	6.4	145	20	86.0	7.3	8
SEPT.	69	4.5	93.5	4.4	146	4	97.0	9.6	20
OCT.	230	2.2	99.0	18.8	280	4	98.5	22.8	12
NOV.	43	6.4	85.0	3.4	76	4	94.5	6.8	32
DEC.	84	2.4	97.0	7.5	82	2	97.5	7.4	14
TOTAL	-	-	-	115.9	-	-	-	129.5	159
AVG.	134	6	95.5	9.7	149	6	96.0	10.8	13

COMMENTS

The average BOD concentration of the raw sewage in 1965 was 134 ppm. This figure was obtained from 8 8-hour composite samples. The average BOD concentration of the raw sewage increased considerably in 1965.

The average SS concentration in the raw sewage in 1965 was 149 ppm from 8 - 8-hour composite samples. The SS concentration also increased in 1965.

Approximately 9.7 tons of BOD and 10.8 tons of SS were removed from the waste in 1965.

The average BOD and SS of the effluent was 6 ppm which is well below the OWRC objective of 15 ppm.

The amount of grit removed from the waste was quite high, especially since the system is a domestic sewage system.


133,600
DIGESTION TANK OPERATION
X 1,000 SLUDGE TO DIGESTER
100
90
80
70
60
50
40
30
20
10
0
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV DEC
1964
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1965
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV. DEC.
19 ____
JAN FEB MAR APR. MAY JUNE JULY AUG SEPT OCT. NOV. DEC.
19 ____
JAN. FEB. MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 ____

DIGESTER OPERATION

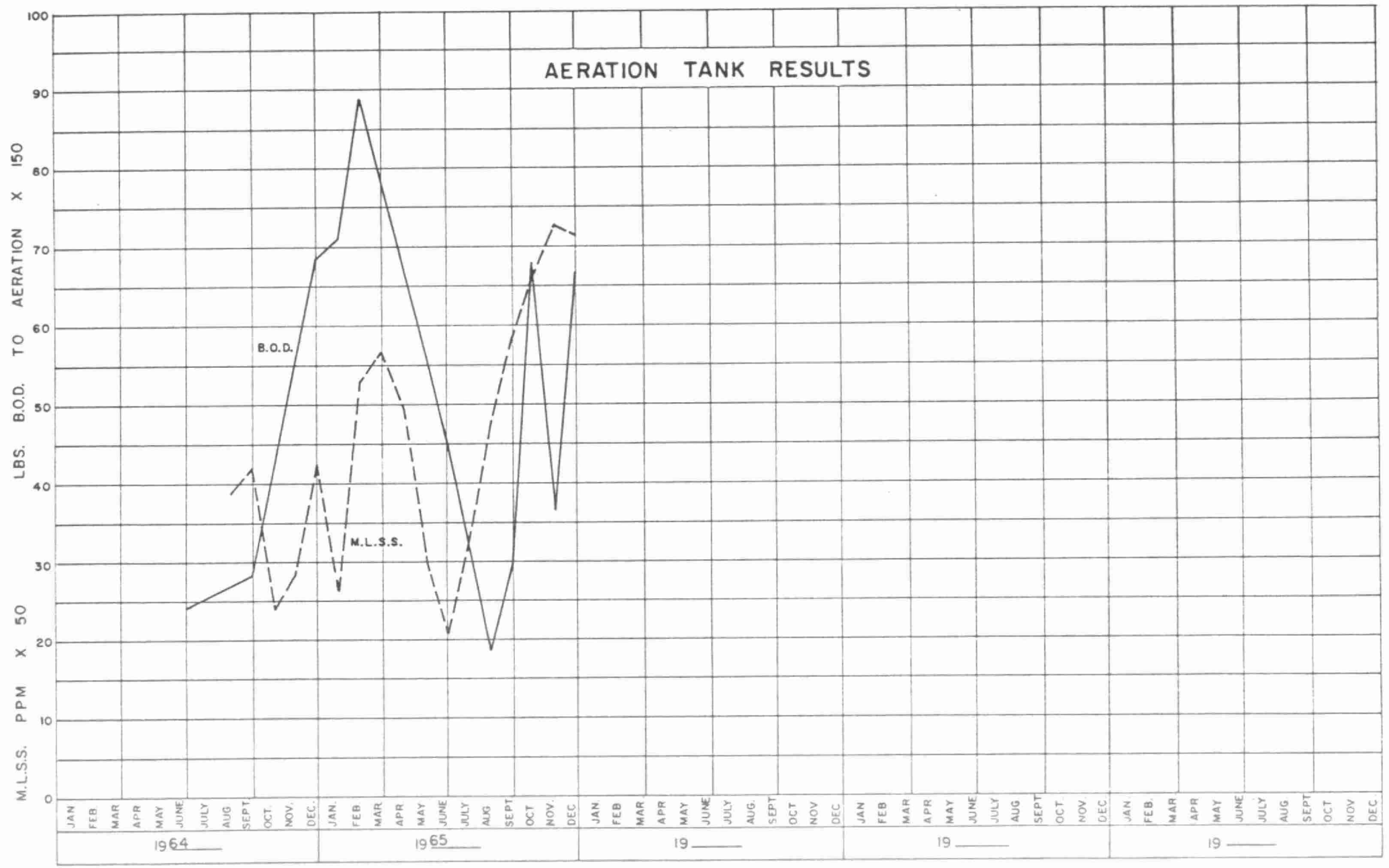
MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU FT.	% SOLIDS	% VOL. MAT.	1000'S CU FT.	% SOLIDS	% VOL. MAT	
JAN.	7.80	2.80	2.30	-	-	-	-
FEB.	3.46	1.16	-	-	-	-	-
MAR.	4.33	-	-	-	-	-	-
APR.	5.75	-	-	6.4	-	-	-
MAY	8.68	-	-	-	-	-	-
JUNE	7.64	-	-	-	-	-	-
JULY	9.33	-	-	-	-	-	-
AUG.	12.55	2.70	2.11	-	-	-	-
SEPT.	9.89	3.78	2.85	6.4	-	-	-
OCT.	10.69	4.36	3.35	-	-	-	-
NOV.	10.24	4.60	3.31	-	-	-	-
DEC.	9.29	5.24	3.55	-	-	-	-
TOTAL	99.65	-	-	12.8	-	-	-
AVG.	8.30	3.52	2.91	6.4	-	-	-

COMMENTS

In 1965, 99,650 cubic feet of raw sludge were pumped to the digesters. The raw sludge was decomposed in the digester to form methane gas, carbon dioxide, smaller quantities of some other gases and water. The excess liquid was returned to the plant for further treatment.

Since there is no sewage gas meter at the plant, the quantity of gas production could not be measured.

The average raw sludge concentration of 3.5 percent solids is comparable with results at other plants.


AERATION TANK RESULTS
M.L.S.S. PPM X 50
LBS. B.O.D. TO AERATION X 150
B.O.D.
M.L.S.S.
0
10
20
30
40
50
60
70
80
90
100
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV. DEC.
1964
JAN. FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV. DEC
1965
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV DEC
19
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV DEC.
19
JAN FEB. MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
19

AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	78	1317	9	1616
FEBRUARY	92	2657	6	2894
MARCH	-	2842	-	-
APRIL	-	2483	-	-
MAY	-	1526	-	-
JUNE	58	1066	10	4604
JULY	-	1647	-	-
AUGUST	24	2408	2	24700
SEPTEMBER	32	2940	2	12118
OCTOBER	62	3325	4	3721
NOVEMBER	29	3653	3	6970
DECEMBER	55	3593	4	3608
TOTAL	-	-	-	-
AVERAGE	54	2455	5	8268

COMMENTS

The average mixed liquor suspended solids concentration in the aeration tanks was 2455 ppm. This concentration is rather high in view of the low BOD loading. The BOD loading of 5 pounds of BOD per 100 pounds of mixed liquor suspended solids is a low ratio.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	13.651	-	-
FEBRUARY	14.564	-	-
MARCH	16.672	-	-
APRIL	18.817	-	-
MAY	13.783	* 364	3.15
JUNE	11.848	501	4.23
JULY	12.643	647	5.12
AUGUST	11.718	656	5.60
SEPTEMBER	13.596	528	3.88
OCTOBER	16.487	** 366	2.29
NOVEMBER	18.837	-	-
DECEMBER	18.489	-	-
TOTAL	181.105	3062	-
AVERAGE	15.092	510	3.97

* 26 days chlorination
** 30 days chlorination

COMMENTS

Chlorination is practiced at this plant for effluent disinfection. The chlorination season begins May 15 and ends October 15.

A chlorine dosage of 3.97 ppm was required to obtain the Commission objectives of a 0.5 ppm chlorine residual after a contact of 15 minutes.

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RESOURCES COMMISSION

RECOMMENDATIONS

1. Every effort should be made to eliminate storm water from the sanitary sewage collection system.

2. An engineering study should be made on pumping capacities of the three pumping stations within the Township including recommendations as to when the capacity should be increased.

DATE DUE

TD/227/K56/K56/1965/MOE
Ontario Water Resources Co
Kingston water
pollution control plant: atgv
annual report c.1 a aa
1965

Environment Ontario
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